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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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|-----------------|-------------|----------------------|---------------------|------------------|

10/055,580

01/22/2002

Jin-Yuan Lee

JCLA8678

6089

7590

07/05/2002

J.C. Patents, Inc.
Suite 250
4 Venture
Irvine, CA 92618

EXAMINER

MITCHELL, JAMES M

ART UNIT

PAPER NUMBER

2827

DATE MAILED: 07/05/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/055,580

Applicant(s)

LEE ET AL.

Examiner

James Mitchell

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-11 and 36-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 36-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the election filed June 17, 2002.

Election

2. Applicant's election without traverse of claims 1-11 and 36-43 in Paper No. 4 is acknowledged. Claims 12-35 and 44-69 have been canceled per election filed June 17, 2002.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-11 and 36-43 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 1 recites the limitation "the bonding pad and the chip" in Line 3. Claim 36 recites the limitation "the solder mask" in Line 8. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1,2, 4, 5, 7, 8, 36, 37, 39, 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamai (JP 409045691).

7. Yamai (English Abstract; Fig 3j, 4a) discloses a cylindrical bonding structure on a chip having one or more bonding pads thereon, comprising: a conductive cylinder ("pillar" shape, 10b) solder alloy of lead and tin (Translation Paragraph 0020, Line 5) on an original bonding pad (2) of a chip (1), an inherent solder block cylindrical cap (11; formed uniform with cylinder shape) of an alloy of lead and tin (Translation Paragraph 0020, Lines 7-8) having a melting point lower than the conductive cylinder (10b); wherein the solder block is a solder ball (16; Translation Paragraph 0018, Line 3); a bonding structure on an inherent silicon chip that may flip over, and a solder mask (3) wherein an opening exposes the junction pad.

8. Claims 1 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Anonymous (RD 291011).

9. Anonymous discloses a cylindrical bonding structure on a chip having one or more bonding pads thereon, comprising: a conductive cylinder (B) on an inherent original bonding pad of a chip ("chip"), a solder block cap (A) having a melting point lower than the conductive cylinder; wherein a solder ball metallic contact (D) is between the conductive cylinder and said pad.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 3 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamai as applied to claim 1 and 36 and further in combination with Baba (U.S. 6,016,013).

13. Yamai does not disclose that the pad is formed in redistribution circuit layer (as understood to mean a layer that allows the original pad to be relocated somewhere else on the chip).

14. However, Baba utilizes a redistribution circuit layer by extending original pad (9) to another location on chip (pad, 13).

15. It would have been obvious to one of ordinary skill in the to modify the pad structure of Yamai by incorporating a redistribution circuit layer in order to further improve the reliability of the connection made by the metal bumps as taught by Baba (Abstract).

16. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamai as applied to claim 5 and further in combination with Tago et al. (U.S. 5,508,561).

17. Yamai does not appear to disclose that said solder cap has an outer diameter smaller than said conductive cylinder.
18. However, Tago (Fig 14B) utilizes a solder cap with an outer diameter smaller than said conductive cylinder.
19. It would have been obvious to one of ordinary skill in the art to modify the solder cap of Yamai by making it have a smaller outer diameter than said conductive cylinder, in order to short circuits with adjacent pads as taught by Tago (Column 10, Lines 13-17).
20. Claims 10, 11, 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamai as applied to claims 1 and 36 and further in combination with Chiu (U.S 5,641,990).
21. Yamai does not appear to disclose a transition layer comprising at least one conductive layer between said cylinder and said conductive block.
22. However, Chui (Fig 4A) utilizes a conductive transition layer (Column 6, Lines 1-3) comprising at least one conductive layer between said cylinder and said conductive block.
23. It would have been obvious to one of ordinary skill in the art to incorporate a conductive transition layer between said cylinder and said block in order to prevent a collapse of said cylinder manufacture as taught by Chui (Column 6, Lines 10-14).
24. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamai.
25. Yamai discloses the elements stated in paragraph 7, but do not show a ball contact metallic layer between the conductive cylinder and the bonding pad.


26. It would have been obvious to one ordinary skill in the art at the time the invention was made to form the contact metallic ball layer between said conductive cylinder and the bonding pad, since it has been held that mere rearranging parts of an invention involves only routine skill in the art. In re Japikse, 86 USPQ 70 (CCPA 1950).

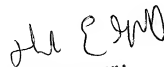
Conclusion

27. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Mitchell whose telephone number is (703) 305-0244. The examiner can normally be reached on M-F 10:30-8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3230 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.


jmm
July 1, 2002


DAVID E. GRAYBILL
PRIMARY EXAMINER